NOTICE.—After Dec. 1 send all subscriptions, renewals, remittances and orders for back numbers to THE JOURNAL OF GEOGRAPHY, Broadway at 156th St., New York.

DEC 9 1918

The JOURNAL of GEOGRAPHY

A Monthly Magazine Devoted to the Interests of Teachers of Geography in Elementary, Secondary, and Normal Schools

RAY HUGHES WHITBECK, Editor
Professor of Geography at the University of Wisconsin

VOLUME XVII DECEMBER, 1918 NUMBER 4

CONTENTS

PAGE

Agriculture in China - - - - - - - - *Ira C. Davis* 129
Suez Canal Traffic for 1917 - - - - - - - - - 136
A Short Bibliography of U. S. Climatology - - *R. De C. Ward* 137
Salt Lake City and Its Geographical Setting (Map) - *Jehiel S. Davis* 145
Important Notice - - - - - - - - - - - - 151
Ohio Canals (Map) - - - - - - *Charles K. Chapman* 152
Calcutta - - - - - - - - - - *Albertine Meisner* 158
The Value of Place Geography in a Commercial Geography Course - - - - - - - - - - - *Esther Westinger* 162
Notes - - - - - - - - - - *George G. Chisholm* 168
Development of Power Resources in the United Kingdom - - 168
Interesting Sidelights on Recent Conditions in Russia - - 164
Industrial Development of the Firth of Forth Area - - - 166
The Caverns of Luray - - - - - - - - *R. H. Whitbeck* 168
Editorial—The American Geographical Society and the Journal of Geography - - - - - - - - - - *The Editor* 169
A Few Examples of German Boasts and Threats - - - - - 167
Recent Publications - - - - - - - - - - - 170
Map of Western War Front, Nov. 11, 1918 - - - - - - 172

Authors Are Personally Responsible for Opinions and Statements Expressed in Their Papers.
Editorial Office—The University of Wisconsin, Madison. Publication Office—Lancaster, Pa.
On Jan. 1, 1919, the magazine will pass under the management and ownership of the
AMERICAN GEOGRAPHICAL SOCIETY OF NEW YORK
Entered as second class matter Sept. 9, 1915, at the postoffice at Appleton, Wis., under the act of March 3, 1879.

The Journal of Geography

Published Monthly Except July and August

Successor to the Journal of School Geography, Vol. V, and the Bulletin of the American Bureau of Geography, Vol. II.

Editor
RAY HUGHES WHITBECK.
Professor of Geography, University of Wisconsin.

Send subscriptions and all correspondence regarding subscriptions to Appleton, Wisconsin. Send manuscripts and all correspondence regarding editorial matters or advertising to Madison, Wisconsin.

Contributing Editors, until Jan. 1, 1919

ISAIAH BOWMAN, Director of the American Geographical Society, New York.

ALBERT PERRY BRIGHAM, Professor of Geology, Colgate University, Hamilton, N. Y.

JAMES F. CHAMBERLAIN, Professor of Geography, State Normal School, Los Angeles, Cal.

GEORGE E. CONDRA, Professor of Geography, University of Nebraska, Lincoln.

RICHARD E. DODGE, Washington, Conn.

WILLIAM M. DAVIS, Cambridge, Mass.

PHILIP EMERSON, Principal Cobbet Grammar School, Lynn, Mass.

N. M. FENNEMAN, Professor of Geology, University of Cincinnati.

WILLIAM M. GREGORY, Professor of Geography, Normal School, Cleveland, O.

J. PAUL GOODE, Professor of Geography, University of Chicago.

MARK JEFFERSON, Professor of Geography, State Normal College, Ypsilanti, Mich.

A. E. PARKINS, Professor of Geography, Peabody College for Teachers, Nashville, Tenn.

C. J. POSEY, Assistant Professor of Geography, University of Minnesota, Minneapolis.

EDWIN J. SAUNDERS, Assistant Professor of Geology, University of Washington, Seattle.

ROBERT DeC. WARD, Professor of Climatology, Harvard University, Cambridge.

Contributing Editor for China, WALTER N. LACY, Anglo-Chinese College, Foochow, China.

Contributing Editor for Great Britain, GEORGE G. CHISHOLM, Lecturer in Geography, University of Edinburgh, Scotland.

Rules of Publication

PRICE—The subscription price is one dollar a year, payable in advance. Fifteen cents a copy.

POSTAGE IS PREPAID by the publisher for all subscriptions in the United States, Hawaiian Islands, Philippine Islands, Guam, Porto Rico, Tutuila and Samoa. Add 10 cents postage for Mexico and Canada. For all other countries in the Universal Postal Union add thirty cents for postage.

CHANGE OF ADDRESS—When a change of address is ordered, both the new and the old addresses must be given. The notice should be sent ten days before the change is to take effect. Subscribers who fail to give notice of change are responsible for payment of all copies sent until notice is received. The post-offices do not forward second-class mail matter. Subscribers who do not observe this rule will not be sent duplicate copies.

HOW TO REMIT—Remittance should be sent by Check, Draft, Express Order, or Money Order, payable to order of The Journal of Geography. It is, as a rule, safe to send a dollar bill without registering, but sender must assume the risk. Larger amounts should not be sent in cash.

B. A. Sinnen, Circulation Manager

Appleton, Wis.

COMPLETE History Map Equipment

Ancient History

W. & A. K. Johnston's Ancient History Series comprising 6 large maps (52 in. wide by 44 in. long), lithographed in pleasing colors, the standard of authority—the set of 6 double size maps, backed with durable muslin, eyeleted, ***with Nyco Duplicate Wall Hangers*** **$28.00**

European History

W. & A. K. Johnston's Mediaeval and Modern Series, 24 Wall size Maps (40x30 in), covers European History completely, beginning with and including the Formation of the Roman Empire to the outbreak of the Great War, 1914. Lithographed from stone in bold colors, especially adapted to this series. The complete set of 24 maps in chart form, with tripod stand and manual..... **$28.00**

American History

Sanford's Series of 32 large Wall Size (38x48 in.) maps, in clear, attractive colors and exactingly accurate—the full set of 32 in chart form with stand and manual **$24.00**

$80.00

The Three Sets in One Order—$75.00

Order all at one time—save $5.00.

All on Approval if Desired.

Used in Universities, Normal Schools and High Schools everywhere.

Send in Coupon for Descriptive Booklets.

Gentlemen: Send me free descriptive booklets on your complete line of History Map equipment.

Signed .....

Address.....

JG10

A. J. Nystrom & Co.

2249-53 Calumet Ave.

CHICAGO

Better Maps—Globes—Charts

Young People Will Rule the World

The young people of today will be the statesmen and leaders of tomorrow. How shall they be educated for the great task of reconstruction? What **must** be the spirit of education if a new world order is to be achieved and maintained?

H. G. Wells, the Author of "Mr. Britling"

has written a new novel—the story of two young people—in which he answers these questions. No more inspiring story could have been written for teachers in these days of change and hope.

Joan and Peter

compels your interest. It is, in the words of **The Dial,** "a triumphant achievement . . . . A living story." Its significant message is written for you and teachers everywhere in the world.

A Novel of the New Spirit in Education

Now at all Bookstores or by mail, $1.75

The Macmillan Company

Boston **New York** **Chicago**
Atlanta **San Francisco** **Dallas**

The JOURNAL of GEOGRAPHY

Volume XVII DECEMBER 1918 Number 4

AGRICULTURE IN CHINA

By IRA C. DAVIS
University High School, Madison, Wis.

IN describing the agricultural conditions in China, it is necessary to understand the conditions existing there and in the United States. We have more than twenty acres for every man, woman, and child, while China has less than two acres per capita, with a large amount of poor land; in fact, half of the land even in China proper is mountain land that cannot be cultivated.

If their land must support such a dense population, and has done it for three thousand to four thousand years, then we must admit that the Chinese understand the principles underlying permanent agriculture. The question with the Chinese farmer is How much can I grow on one acre? The labor cost does not enter into the situation because labor is the one thing they have in superabundance.

Their agriculture, being of the intensive variety, differs in all respects from agriculture as developed in the United States. Their farms are small compared with those here, while their methods of tilling and fertilizing the soil, planting the crops, and harvesting the crops, differ in all respects. Our method involves the use of machinery wherever possible while their method is agriculture with the use of manual labor.

HIGH MAINTENANCE CAPACITY OF CHINESE FARMS

While it is impossible to get accurate statistics in China, it is possible to get a few scattering statistics from a few farmers in the more progressive parts of China. In Shantung Province, a farmer had ten children in the family; he kept one donkey, one cow, both exclusively laboring animals, and two pigs on two and one-half acres of cultivated land, where he grew millet, wheat, sweet potatoes, and beans. This would give a density of population of 3,072 people, 256 donkeys, 256 cattle, and 512 swine per square mile. The average of seven Chinese holdings indicated a maintenance capacity of 1,783 people, 212 cattle or donkeys, and 399 swine per square mile. The 400,000,000 people of China raise their food on an area considerably smaller than the cultivated area of the United States.

NOTE. The principal sources drawn upon for material were King's *Farmers of 40 Centuries* and Mill's *International Geography.*

Favoring Climatic Conditions

Many factors enter into the high maintenance efficiency of China. The densely populated area has a favorable geographic position as far as agricultural conditions are concerned. Canton has the latitude of Havana, while Mukden is only as far north as New York City. The densely populated parts of China are between 20° and 40° north latitude, about 700 miles further south than the central United States. This difference of position gives them a longer season, and it has made it possible for them to devise systems of agriculture, whereby they grow as many as four crops each year.

The rainfall in China is not only greater than in our Atlantic or Gulf states but it falls more exclusively during the summer season when its efficiency in crop production may be the highest. South China has an annual rainfall of eighty inches, with little of it during the winter. In the Shantung Province, they have an annual rainfall of over twenty-four inches, seventeen of these falling from May to September, with most of it during July and August. The right amount of available moisture coming at the right time is one of the prime factors in the high maintenance capacity of any soil. This is one of the reasons why it is possible to produce such large yields in China.

Large Returns Per Acre

In Chikiang Province, there may be a crop of rape, of wheat, of barley, or Windsor beans, which is followed in summer by cotton or rice. In the Shantung Province, wheat or barley is sown in the winter or spring, and followed in summer by millet, sweet potatoes, soy beans, or peanuts. At Tientsin, about the same latitude as Springfield, Illinois, they follow a crop of wheat with onions, then cabbage, realizing from the three crops, about $160 per acre. Another system of cropping is to plant Irish potatoes in early spring, following the potatoes with radishes, then cabbage, and realizing from the three crops at the rate of $200 per acre.

System of Super-fertilization

Notwithstanding the fact that in China the soils are naturally more than ordinarily deep, inherently fertile and enduring, judicious and rational methods of fertilization are everywhere practiced. All cultivated lands, including adjacent hills and mountain sides, the canals, the streams and the sea have been made to contribute what they could to the fertilization of the fields. All but the inaccessible portions of their vast extent of

mountain lands have long been taxed to their full capacity, for fuel, for lumber and herbage, for green manure and compost material. The ash of practically all of the fuel and of all the lumber used at home finds its way ultimately to the fields as fertilizer. Enormous quantities of canal mud are applied to the fields, sometimes at the rate of seventy or more tons to an acre. So, too, where there are no canals, both soil and subsoil are carried into the villages, and there between the intervals when they are needed, are at the expense of great labor, composted with organic material and afterwards often dried and pulverized before being carried back and used on the fields as home-made fertilizers. Manure of all kinds is religiously saved and applied to the fields in a manner which secures the greatest efficiency.

Use of Nitrogen-fixing Legumes

Centuries of practice have taught the Chinese farmer that the culture and use of leguminous crops is essential to enduring fertility, and so the growing of legumes in rotation with other crops for the express purpose of fertilizing the soil has become a common practice with them. Just before or immediately after the rice crop is harvested, fields are often sown to clover, which is allowed to grow until the next transplanting time, when it is either turned under directly, or more often stacked along the canals and saturated with mud dipped from the bottom of the canal. After fermenting twenty or thirty days it is applied to the field.

Lengthening the Growing Season

The Chinese farmers are time economizers beyond all others. They have long realized that much time is required to transform organic matter into forms available for plant food. The largest part of this organic matter is predigested with soil or subsoil before it is applied to the fields, and at an enormous cost of time and labor, but it has the effect of lengthening their growing season, and it enables them to adopt a system of multiple cropping which would not otherwise be possible. By planting in hills and rows with intertillage, it is very common to see three crops growing upon the same field at the same time, but in different stages of maturity, one nearly ready to harvest, one just coming up, and the other at the stage when it is drawing most heavily on the soil. By such practices, with heavy fertilization, and supplemental irrigation when needful, the soil is made to do full duty throughout the growing season.

Another of their time-saving practices is the planting of cot-

ton in wheat fields before the wheat is ready to harvest. To save time or lengthen the growing season of the cotton, the seed is sown broadcast among the grain ten or fifteen days before the wheat is to be harvested. To cover the seed, the soil in the furrows between the beds is spaded loose to a depth of four or five inches, finely pulverized, and then evenly scattered over the bed. This loose earth acts as a mulch to conserve the capillary moisture, permitting the soil to become sufficiently damp to germinate the seed before the wheat is harvested. Later the cotton plants are hoed and thinned to a stand of about one plant for each square foot of space. This practice saves about thirty days in the growing season for cotton.

The System of Multiple Cropping

The growing of multiple crops is the rule throughout China wherever the climate permits. The general practice of planting all crops in rows lends itself readily to systems of multiple cropping. For one system of multiple cropping, they will have winter wheat near maturity, a crop of Windsor beans about two-thirds grown, and cotton just planted. The fields in this case are thrown into ridges about five feet wide with furrows between. This system permits of thorough cultivation, plenty of water by irrigation, and plenty of space between the rows for the insertion of fertilizers. Besides this they have late fall crops to follow the cotton. In southern China where the climate is warmer and where the rainfall is greater, it is possible to grow as many as seven crops in one year.

Soil Conservation and Extension

The Chinese are always trying to add to their available land area by the building of delta plains, draining and filling marsh lands, and by preventing soil erosion. It is estimated that the Hoang River carries sufficient sediment to inundate thirty-three square miles of level country ten feet deep in twenty-four hours. The canalization of the delta and flood plains of China has been one of the most fundamental and fruitful measures for the conservation of her national resources that they could have undertaken, for it has greatly augmented the extension of the coastal plains. To prevent soil erosion, they cover the ground in hilly regions with straw. This treatment keeps the rain where it falls, giving the soil opportunity to receive it under the impulse of both capillarity and gravity and with it the soluble ash ingredients leached from the straw.

Chinese Are Mostly Vegetarians

The Chinese are vegetarians to a far higher degree than are most western peoples and the high maintenance efficiency of agriculture in China is in great measure rendered possible by the adoption of a diet so largely vegetarian. Statistics prove that one thousand bushels of grain have five times as much food value and will support five times as many people as will the meat or milk that can be produced from it. Of one-hundred pounds of dry substance fed to cattle, only four pounds appear in the form of human food, but five pounds from sheep and eleven pounds from swine. It is remarkable that the Chinese long ago discarded cattle as milk and meat producers; they use sheep for their pelts and wool more than for food, while swine have been retained as transformers of coarse substances into human food.

Important advantages are gained in adopting succulent forms of vegetables as human foods. At this stage of maturity they have a higher digestibility, their nitrogen content is higher, and this in a measure compensates for the absence of meat. By devoting the soil to growing vegetables which man can readily digest, they save sixty pounds out of every one hundred pounds that would be wasted in the feeding of cattle. In using these immature forms of vegetation they are able to produce an immense amount that would otherwise be impossible, for this is grown in a shorter time, permitting the same soil to produce more crops. It is also produced late in the fall and early in the spring when the season is too cold and the hours of sunshine too few each day to permit of ripening crops.

The Wise Selection of Crops

The selection of the quick maturing, drought resisting millets as the great staple food crop, wherever water is not available for irrigation, has enabled the Chinese to secure maximum returns in seasons of drought and in districts where the rainfall is small. The millets thrive in the hot summer climate; they survive where the available moisture is reduced to a low limit, and they grow vigorously when the heavy rains come. Thus we find in China, with more rainfall and a better distribution of it than occurs in the United States, and with warmer, longer seasons, that these people have with rare wisdom combined both irrigation and dry farming methods to an extent and an intensity far beyond anything known in this country.

Rape is remarkable for the way it fits into the economies of the Chinese people. It is a near relative of mustard and cabbage; it grows rapidly during the cooler portions of the season,

the spring crop ripening before the planting of rice and cotton; its young leaves and roots are succulent, nutritious, readily digested and extensively used as human food. It bears a heavy crop of seed, rich in oil, which has been used for lights and in cooking, while the rape seed cake is highly prized as a fertilizer. Rape produces fat, in the ratio of about forty pounds of oil to a hundred pounds of seed.

Rice the Greatest of All Crops

The basal food crop of China is rice. Their wonderful systems of canals, of which they have over 200,000 miles, contribute primarily to the success of rice culture. China has as many acres in rice as the United States has in wheat, and her annual product is nearly three times as much as our wheat crop; yet the whole rice area produces at least one and sometimes two other crops each year. Records show an average yield of forty-two bushels of water rice per acre, twenty-two bushels of dry land rice per acre, and an average yield of wheat of twenty-five bushels per acre.

Notwithstanding the enormous acreage of rice planted each year, it is all set in hills and every spear is transplanted by hand. Doing this, they save in many ways except in the matter of human labor. By thoroughly preparing the seed bed, fertilizing highly, and giving the most careful attention, they are able to grow on one acre, during thirty to fifty days, enough plants to occupy ten acres. In the meantime on the other nine acres, crops are maturing, being harvested, and the fields being fitted to receive the rice when it is ready for transplanting.

The Cultivation of Rice

In northern China, the nursery beds of rice are planted about the middle of April, sowing seed at the rate of twenty bushels per acre. The seed is scattered directly upon the surface of the ground and about thick enough to cover the ground. Then the seeds are pushed into the soil with flat bottomed baskets. The rice plants are allowed to grow in the nursery beds about one month and usually reach a height of eight or ten inches.

The fields upon which most of the rice is grown have all been graded to a water level and surrounded by low, narrow, raised rims. If the country is not level, then the slopes are graded into horizontal terraces varying in size according to the steepness of the areas in which they are cut. Some of them are often no larger than a small room, while over half of the allotments are less than one-eighth of an acre.

The month which precedes the transplanting of rice is a very busy one for the Chinese farmer. The soil must be plowed, smoothed, leveled and worked into the consistency of mortar. This thorough puddling of the soil permits the plants to be quickly set and provides conditions which insure immediate and perfect contact for the roots. Water is not turned on the fields until it is time to transplant the rice. When the fields are ready, women generally pull the rice plants, carefully rinse the soil from the roots, and then tie them into bundles. These bundles are distributed over the fields and men transplant the rice in rows about one foot apart, and the hills which contain six to eight plants, are about nine inches apart. One man can transplant about one-third of an acre per day at an estimated cost of twenty-one cents per acre.

After the rice has been transplanted, it must be hoed, fertilized, and watered. Previous to the time of cutting, after the seed is well matured, the water is drawn off, and the land permitted to dry and harden. The rainy season is not over and great care must be taken in curing the crop. The rice is cut hill by hill and tied into bundles. The threshing is accomplished by drawing the heads through the teeth of a metal comb. After the rice is threshed the grain must be hulled before it can serve as food.

The many uses of rice straw makes it almost as important as the rice itself. It is used as food and bedding for cattle, as the thatching material for dwellings and other shelters, as fuel, as a mulch, as a source of organic matter for the soil, and as a fertilizer. Besides these ultimate uses, rice straw is used in the manufacture of articles used in enormous quantities. The estimated returns for the rice is $60.00 per acre while the straw is worth nearly $8.00 per acre.

Large Amount of Land Occupied by Graves

The superstition of the Chinese that it would be sacrilegious for them to use their grave lands has rendered a large part of their land practically useless for agricultural purposes. These grave lands occupy not only large areas of valuable land but are much in the way of agricultural operations. Everywhere in China the proportion of grave lands to cultivated land is large. In the vicinity of Canton, over 50% of the land is given over to graves, which are located on the higher and dryer lands. Hilly lands not readily cultivated, and especially within the reach of cities, are largely so used. These grave lands are not altogether unproductive for they are generally overgrown with herbage and used as pastures for geese, sheep, goats, and cattle. If the herbage is not eaten off by animals, it is usually cut for feed, for fuel, for green

manure, or for use in the production of compost to enrich the soil.

Land Tenure and Land Values

Most of the farmers in China own their land, the average holdings of the better class of farmers being from one and two-thirds to two and one-third acres. Rice lands are sold from $75.00 to $130.00 per acre with some of the best land selling as high as $200.00 per acre. The prices for land are rising rapidly. The farmers who rent their lands usually give one-half of the crop to the landlords. Although land taxes are high in China it is not infrequent for the same tax to be levied twice and even three times in one year. The taxes in different parts of China vary from eight cents to $3.87 per acre.

Conclusion

Almost every foot of land is made to contribute material for food, fuel or fabric. Everything which can be made edible serves as food for man or domestic animals; whatever cannot be eaten or worn is used for fuel. The wastes of the body, of fuel and of worn fabric, are taken back to the field; before doing so they are housed against waste from weather, compounded with intelligence and forethought and patiently labored with through one, three or even six months, to bring them into the most efficient form to serve as manure for the soil or as food for the crop. It seems to be a golden rule with these industrial classes that whenever an extra hour or a day of labor can promise even a little larger return, then it is given, and neither a rainy day nor the hottest sunshine is permitted to cancel the obligation or defer its execution.

SUEZ CANAL TRAFFIC FOR 1917.

Traffic through the Suez Canal during 1917, totaling 2,353 transits representing 8,368,918 tons, was 32.10 per cent less than in the preceding year, 58.23 per cent below the 1913 figure (the latest year during which normal conditions prevailed), and consisted of:

Class of Vessel.	Number of Transits.	Net Tons.
Merchant vessels:		
Laden	522	2,042,729
In ballast	220	799,285
Vessels carrying mail	209	919,625
Government vessels	312	713,751
Government-chartered vessels	1,090	3,893,528
Total	2,353	8,368,918

A SHORT BIBLIOGRAPHY OF UNITED STATES CLIMATOLOGY*

By Robert De C. Ward
Professor of Climatology, Harvard University

The Basis of Climatological Study:— Climatology deals with the same group of atmospheric conditions, or *elements*, as those with which meteorology is concerned. The characteristics of each of these *climatic elements* are set forth, and a full description of a climate is given, by means of a standard series of numerical values, based on systematic and long-continued meteorological records, carefully corrected, compared, and summarized by well-known methods, and tabulated in standard form.

Early Individual Observations in the United States:— Every person who carefully records an extended series of accurate meteorological observations therefore potentially contributes to a better knowledge of the climatology of his country. American climatology really owes its beginnings to the pioneers who, alone and with inadequate facilities and equipment, faithfully kept their daily records in the earlier years of the country's history. Names which may well be remembered are those of Rev. John Campanius, who, in 1644-45, at the Swedes' Fort, near Wilmington, Del., kept what is believed to have been the first regular record of the weather on the North American continent; of Hon. Paul Dudley, Chief Justice of Massachusetts, who kept a meteorological record at Boston, Mass., in 1729-30; of Dr. John Lining, who began thermometer records at Charleston, So. C., in 1730, and maintained a more extended series of observations from 1738 to 1750; of Professor John Winthrop, of Harvard College, who, from 1742 to 1778, kept regular weather records at Cambridge, Mass.[1] It is not unworthy of mention that Thomas Jefferson, at Monticello, Va., and James Madison, at Williamsburg, Va., "maintained a series of contemporaneous observations" during the period 1772-1777, and "showed that the climatic peculiarities of those two places harmonize completely[2]". And Benjamin Franklin, also, scientifically best known because of his famous kite experiment, kept records of weather and of water temperatures during his homeward voyage from England.

The Beginnings of Organized Meteorological Observations: —The early pioneers were enthusiastic observers and did painstaking work, but their efforts were scattered and could not con-

*Read (by title) before the American Climatological and Clinical Association at Boston, Mass., June 6, 1918.

tribute to the development of scientific climatology. Cooperation and coordination of effort were essential, and these involved organization, and a central control. Thus it gradually came about that the local observers became part of a system, and uniformity of work, on an increasing scale, replaced the more or less haphazard and irregular observations of the earlier period. The first series of meteorological observations organized under National control was inaugurated by the Medical Department of the Army in 1819. By an order of the Surgeon-General, dated July, 1816, it became the duty of each hospital surgeon "to keep a diary of the weather", and these "diaries" have been continued at many Army medical posts ever since, although the records have, since 1890, been turned over to the Weather Bureau. "Meteorological Registers", embodying the results of these observations, were issued at various times, and in 1860 the Surgeon-General published a report which brought the results down to date, thus covering about 40 years.[3] In 1842 a volume entitled "The Climate of the United States and Its Endemic Influences", by Dr. Samuel Forry, was based upon the data collected by the Army Medical Department.

The Smithsonian Institution, under its first secretary, Professor Joseph Henry, inaugurated a fairly extended system of observations in 1849. This was continued for 25 years, when (in 1874) the meteorological work of the Institution was formally transferred to the War Department.[4] The number of observers who cooperated in these observations varied from 100 to about 350. The data thus collected were utilized as the basis of several important studies, those of most direct climatological interest being two monographs by Charles A. Schott, both of which appeared in the *Smithsonian Contributions to Knowledge*.[5]

An early volume which may well be called "a real treasure-house of the early meteorological observations made before about 1850" is Lorin Blodget's "Climatology of the United States"[6]. Out of the confused mass of scattering observations which had been accumulating from different sources at the Smithsonian Institution, at the Office of the Surgeon-General, and from "gentlemen at distant points distributed over the country", Blodget brought, so far as was then possible, both order and accuracy. His book is still a valuable summary of many of the outstanding facts of American climates.

After the Medical Department of the Army had begun its meteorological work, and before the Smithsonian Institution had inaugurated its system of observations, the Regents of the University of New York had established a local series of meteorolog-

ical observations in that State (1826-1850), and the Franklin Institute and American Philosophical Society of Philadelphia, with the aid of the State of Pennsylvania, had cooperated in establishing a number of meteorological stations in Pennsylvania (1837). These were the beginnings of local State weather services, all of whcih later became absorbed in the Federal weather service.[7]

THE NATIONAL WEATHER SERVICE:— The actual establishment of a general National Weather Service came in 1870, in a Joint Resolution of Congress (approved Feb. 9, 1870), providing for the taking of meteorological observations at military posts and at other points, and for giving notice of the approach and force of storms. This important undertaking was put in charge of the Chief Signal Officer of the Army, and there remained until July 1, 1890, when it was transferred to the Weather Bureau of the Department of Agriculture.[8]

THE INCREASING EMPHASIS UPON CLIMATOLOGY:— In the early days of the Signal Service, emphasis was naturally chiefly laid upon the immediate problems connected with storm warnings and weather forecasting. This was strictly meteorological work. Gradually, however, as meteorological data began to accumulate, and as agricultural interests became more important, more and more emphasis was laid upon the climatological applications of the national weather service work. The voluntary observers in the different states and territories were more systematically organized; a comprehensive and uniform scheme for taking observations was gradually developed, and regular climatological summaries were published. Thus, after many decades of the slow accumulation of meteorological records, the stage has been reached when the essential facts concerning the climatology of the United States, although not yet ascertained as completely and as accurately as is desirable, or as will eventually be possible, can nevertheless be presented in such a way as to meet all ordinary requirements. It is only in the last two or three decades that the observers have been fairly well distributed over the country; that their number has been reasonably adequate, and that their observations have been made on a comprehensive and uniform plan. Hence, the period covered by the most complete and reliable climatological records is, in most cases, a relatively short one.

THE AVAILABLE STANDARD PUBLICATIONS:— The standard general descriptive and statistical volume is at present Professor A. J. Henry's "Climatology of the United States."[9] The first 84 pages deal with the larger features of the climate of the United

States. For each State there is also given a brief discussion of its essential climatic characteristics, followed by a summary of the more important climatic data, given for representative stations. The latter are grouped by counties, and are alphabetically arranged in the index, so that reference is easy. The statistics as a rule cover the years 1870-1903, but in a good many cases the period is shorter.*

Another valuable body of statistical data is contained in the "Summaries of Climatological Data by Sections".[10] A very large mass of numerical material, especially in regard to rainfall, is here brought together in a convenient form for ready reference, and many of the ordinary questions concerning climatic conditions in the United States which are daily asked by hundreds of persons here find a ready answer. The country is divided into 106 "climatological sections". For each section there is a well-considered brief summary of the topographic and the climatic features. Then follows a compact brief digest of the most essential climatological material which has accumulated during the last half-century, the precipitation data being given in full, not alone by averages for the whole period, but, for the most important data, by individual months and years as well. Monthly and annual amounts of precipitation; averages and extremes of temperature; frost data; wind velocity and direction, and other information, are presented for each station which has a record long enough to give a fairly accurate picture of the actual climatic conditions. For each section there is a full page of diagrams showing the comparative monthly distribution of precipitation at selected stations. These diagrams illustrate very clearly the occurrence of wet and dry seasons, and the local variations in rainfall due to topography and general environment. One of the most useful features is a contoured topographic map of each section, showing the location of the stations and of the principal rivers The period covered by the data varies. For most sections the last year in the tables is 1908. In other cases it is later. Reprints are issued from time to time for the various sections, containing all the data included in the first edition and also bringing the observations down to later dates. Several important additions to the tables have also been made in these reprints. Further, the *Annual Reports of the Chief of the Weather Bureau* contain the continuation of the data for Weather Bureau Stations.**

*The data are, therefore, not homogeneous, and are not reduced to the same period. The temperatures are given in whole degrees (F) only.

**This is a Congressional document. It may usually be obtained by application to members of Congress.

Detailed climatological data, covering all the stations maintained by volunteer cooperative observers as well as the regular Weather Bureau stations, are collected and published in the monthly and annual reports of "Climatological Data", issued at the so-called Section Centers, each Section as a rule corresponding to a State.[11] Further, the "Monthly Weather Review" contains a summary of local weather conditions; the usual standard climatological data for regular Weather Bureau stations; tables of accumulated and excessive precipitation, and a series of charts showing the departure of the mean monthly temperature from the normal; the total monthly precipitation; the percentage of clear sky; the sea-level isobars and isotherms; the total snowfall (in winter months), etc. The *Review* contains many more or less important papers on local and general climatology. Supplements to the *Review* are issued from time to time, containing more extended discussions of various matters of meteorological or climatological importance. Among these, reference may here be made to a monograph by P. C. Day on relative humidity.[12]

In addition to the foregoing standard statistical publications, there is a large and rapidly increasing number of reports, of varying degrees of importance, on the climates of different states or cities. Most of these discussions have appeared in the publications of State or of local scientific and other organizations, and are, therefore, widely scattered. No complete list of these papers is available. Anyone who wishes to secure information in regard to the published discussions of any particular state or district should write to the Chief of the Weather Bureau (Washington, D. C.), or to the officials in charge of the various Section Centers.* Among the most important of these publications the volumes of Professor Oliver L. Fassig, on the climate and weather of Baltimore, and of Professor H. J. Cox and Mr. J. H. Armington, on the weather and climate of Chicago, deserve special mention because of their completeness.[14]

Many publications, both official and other, contain charts. A special set of climatic charts is issued by the Weather Bureau,[15] and the forthcoming meteorological section of the new *Atlas of American Agriculture* will contain the latest and best statistical and cartographic information on the subjects with which it deals. An advance sheet of a new mean annual rainfall map is the only chart of this new *Atlas* which has thus far been published.[16]

A valuable series of papers on various phases of medical climatology has appeared in the Transactions of the American Climatological (now American Climatological and Clinical) Asso-

*A complete list of the names and addresses of these officials is regularly printed in the *Monthly Weather Review*.

ciation. On the general subject of medical climatology in the United States reference should be made to the following work: "Climatology and the Principles of Climatotherapy", by F. Parker Weber, M.D., with the Collaboration for America of Guy Hinsdale, M.D., being volumes III and IV of "A System of Physiologic Therapeutics", edited by S. S. Cohen, 8 vo. Philadelphia, Pa. P. Blakiston's Sons, 1901, pp. 336, 420. Volume IV is devoted to an account of American health resorts.

BIBLIOGRAPHY

1. See: Cleveland Abbe: "A Chronological Outline of the History of Meteorology in the United States of North America", *Monthly Weather Review*, Vol. 37, 1902, pp. 87-89, 146-149, 178-180, 252-253.

Alfred J. Henry: "Early Individual Observers in the United States," Bulletin 11, U. S. Weather Bureau, Pt. II, Washington, D. C., 1895, pp. 291-302.

Burton M. Varney: "Early Meteorology at Harvard College," *Monthly Wea. Rev.* Vol. 36, 1908, pp. 140-142.

2. Alexander Mc Adie: "Simultaneous Meteorological Observations in the United States during the Eighteenth Century". Bulletin 11, U. S. Weather Bureau, Pt. II, 1895, pp. 303-304.

3. Major Charles Smart, U. S. A., "The Connection of the Army Medical Department with the Development of Meteorology in the United States." *ibid*, pp. 207-216.

4. S. P. Langley: "The Meteorological Work of the Smithsonian Institution." *ibid*, pp. 216-220.

5. C. A. Schott: "Tables and Results of the Precipitation in Rain and Snow, in the United States; and at Some Stations in Adjacent Parts of North America and in Central and South America." *Smithson. Contrib.* No. 222. 4to Washington, D. C., 1872, 2d ed. *ibid*, No. 353, 1881.

"Tables, Distribution and Variation of the Atmospheric Temperature in the United States and Some Adjacent Parts of America", *ibid* No. 277. 4to Washington, D. C., 1876.

6. Lorin Blodget: "Climatology of the United States, and of the Temperate Latitudes of the North American Continent: Embracing a full comparison of these with the Climatology of the Temperate Latitudes of Europe and Asia, and especially in Regard to Agriculture, Sanitary Investigations, and Engineering, with

Isothermal and Rain-Charts for each Season, the extreme Months, and the Year. Including a Summary of the Statistics of Meteorological Observations in the United States, condensed from recent scientific and official Publicantions." 4°. Philadelphia, J. B. Lippincott & Co.,; Truebner & Co., London, 1857. XVI, pp. 536.

See also: R. De C. Ward: "Lorin Blodget's Climatology of the United States, An Appreciation." *Monthly Wea. Rev.* Vol. 42, 1914, pp. 23-27.

7. H. H. C. Dunwoody: "State Weather Service Organizations," Bulletin 11, U. S. Weather Bureau, 1895, Pt. II, pp. 285-291.

8. Cleveland Abbe: "The Meteorological Work of the United States Signal Service", *ibid,* pp. 232-285.

9. Bulletin Q., U. S. Weather Bureau, 4 to. Washington, D. C., 1906, pp. 1012, charts 32, figs. 7.

10. Bulletin W, U. S. Weather Bureau. 4 to. Washington, D. C., 1912, 2 vols. The first volume covers the country west of the Mississippi; the second contains the data for stations east of the Mississippi. Price 5 cents for each section; 10 cents for any three sections; $3 for entire set unbound. To be obtained from the Superintendent of Documents, Washington, D. C.

11. "Climatological Data", a monthly volume, in one cover, containing data for all the sections except the Hawaiian Islands and Porto Rico, is issued at 35 cents a copy. Subscription for 12 monthly copies and the annual summary, $4.00. Reprints for single sections, 5 cents each. To be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

12. "Monthly Weather Review". Copies may be obtained from the Superintendent of Documents, as above, at 25 cents each. The subscription price per volume is $2.50.

The Monthly Weather Review up to July, 1909, partook of the nature of a weather magazine and climatological review, giving details of weather conditions for each month, and each number contained articles of permanent interest on practical and scientific lines.

From July, 1909, to Dec. 1913, the Review was made up of the local data of 12 climatological sections of the country.

Since Jan., 1914, all local climatological tables have been transferred to the monthly issues of "Climatological Data."

The Monthly Weather Review since Jan., 1914, comprises the following:

1. Aerology. 2. General meteorology. 3. Forecasts and general conditions of atmosphere. 4. Rivers and floods. 5. Bibliography. 6. Weather of month.

13. P. C. Day: "Relative Humidities and Vapor Pressures over the United States, including a Discussion of Data from Recording Hair Hygrometers." *Monthly Wea. Rev.* Supplement No. 6. Price 25 cents.

14. Oliver L. Fassig: "The Climate and Weather of Baltimore", Maryland Weather Service, Vol. II, 1907, pp. 509.

H. J. Cox and J. H. Armington: "The Weather and Climate of Chicago." *Bulletin* No. 4, Geogr. Soc. of Chicago, 1914.

15. "Climatic Charts of the United States". U. S. Weather Bureau. Washington, D. C. Eleven charts, 10 by 16 inches, 50 cents per set. Separate charts, 5 cents each.

16. R. De C. Ward: "Mean Annual Rainfall of the United States with Notes on the New Chart of Average Annual Precipitation from the 'Atlas of American Agriculture'." *Monthly Wea. Rev.*, Vol. 45, 1917, pp. 338-345.

For additional titles, reference should be made to the price list of Government publications on *Weather* (Price List 48), which may be secured from the Superintendent of Documents, Government Printing Office, Washington, D. C., and to the latest brief list of *Publications of the U. S. Weather Bureau Available for Distribution*, which may be secured from the Chief of the Weather Bureau, Washington, D. C.

Many references to publications of earlier dates will be found in the following:

"Bibliography of Meteorology. A Classed Catalogue of the Printed Literature of Meteorology from the Origin of Printing to the Close of 1881; with a Supplement to the Close of 1889, and an Author Index." Prepared under the direction of Brig. Gen. A. W. Greely, Chief Signal Officer, U. S. A. Edited by Oliver L. Fassig. 4to. Washington, D. C., 1889, 1891. In four parts: Part I, Temperature; Part II, Moisture; Part III, Winds; Part IV, Storms.

SALT LAKE CITY AND ITS GEOGRAPHICAL SETTING

By JEHIEL S. DAVIS*
Formerly of the Salt Lake City High School

THE GENERAL SETTING OF THE CITY

WHERE the Cordillera of North America is widest and midway between Canada and Mexico, also midway between the Sierra Nevada and Rocky mountains stands Salt Lake City. The Great Basin is really a high table land surrounded on most sides by still higher mountains, and lowest at Great Salt Lake, the surface of which fluctuates a very few feet about the elevation of 4220 feet. This Great Salt Lake Basin is the natural center of the whole intermontane section. From all directions canyons and connecting basins lead to Great Salt Lake in accordance with the drainage plan, which, however, is so imperfect that there are several distinct basins separated by broad low passes. These are separated into two groups, The Lahontan group mostly in Nevada, and the Bonneville group mostly in Utah. These were the basins of ancient lakes of the above names. Lake Bonneville overflowed to the north into the Snake River system, where the rim of the basin is lower than at any other point. This notch provides connection between the basin and the valleys to the north.

We are interested in the Bonneville, or Utah Basin. Connection to the south is cut off by the Grand Canyon of Arizona, the most beautiful as well as the most massive of gorges, but there is a low divide to the southwest utilized by the Los Angeles and Salt Lake Railroad. To the east beyond the canyons of the Wasatch is the mountain and valley country of Colorado and Wyoming.

The Mormon settlers crossed the mountains, and when their scouts came down to the lower, warmer levels of this old lake floor it evidently looked attractive. They selected a spot at the foot of a great alluvial cone, once a delta in the vanished lake. This spot was some twenty-five miles east of the southern end of Great Salt Lake. Here they laid out their Zion, now Salt Lake City, on the ten-acre community plan. This explains the large ten-acre block of the city. The point selected for the Temple was at an elevation of 4354 feet above sea level at the north end of a very fertile valley about twenty-five miles each way and surrounded on all sides except the northwest which borders on

* Mr. Davis is now head of the Science Department of the Prescott, Ariz., High School.

the lake. They doubtless knew by the growth they found that the rainfall here was a little larger than in most parts of the Great Basin and that water for irrigation would be obtainable from the lofty Wasatch Range which rises over 7000 feet above the valley on the east side close to the city. (Twin Peaks over 11,500 feet).

Physical Features Connected With Ancient Lake Bonneville

Many features of the valley are direct results of the changes in the lake. Thousands of years ago, probably when the great glaciers reached into central North America, other glaciers came down these mountains into the valley, and the conditions which caused them reduced evaporation and increased precipitation so that the lake enlarged until it emptied over the basin rim through Red Rock Pass into the Snake River, and was a great fresh water inland sea, as large as Lake Huron (about 17,000 square miles); its surface reached an elevation of 5200 feet or 1000 feet above the present level of Great Salt Lake. Here the lake stood until its bottom was deeply covered with rich sediments, and the great shore cliffs and benches were cut forming a marked feature of the landscape. In receding the level of lake stood still again at least twice, cutting shore cliffs and benches. These are the Provo Shore, elevation 4830 feet, which runs through Fort Douglas military post in the northwest corner of Salt Lake City, and the Stansbury Shore, elevation 4515 feet, on which stands the Capitol of Utah, University of Utah, and East High School.

Great Salt Lake

The present Great Salt Lake is the largest remnant of the ancient sea. It has an area of about 2000 square miles, an average depth of fifteen feet and a maximum depth of only forty-five feet. This shallowness has made it possible to build the "cut off" of the Southern Pacific Railroad straight across it at a place where it is some forty miles wide. Another remnant of Lake Bonneville, Utah Lake, sends its waters north through the Jordan River to Salt Lake. The similarity of this to the drainage of Palestine must have appealed to the Mormon settlers and may even have influenced them in locating the city, like Jerusalem, a few miles to the right, the way the river flows, from where it empties into Great Salt Lake, the Dead Sea of America.

The water escaping for ages only by evaporation has left the lake salty, and it is now 18% solid matter of which much is common salt. This gives rise to the salt industry, while other ingredients are chemically important. The density of the water in

which it is scarcely possible to sink makes it a great tourist attraction, and Saltair Pavilion built 2000 feet from shore in the lake west of Salt Lake City is world famous.

Climate

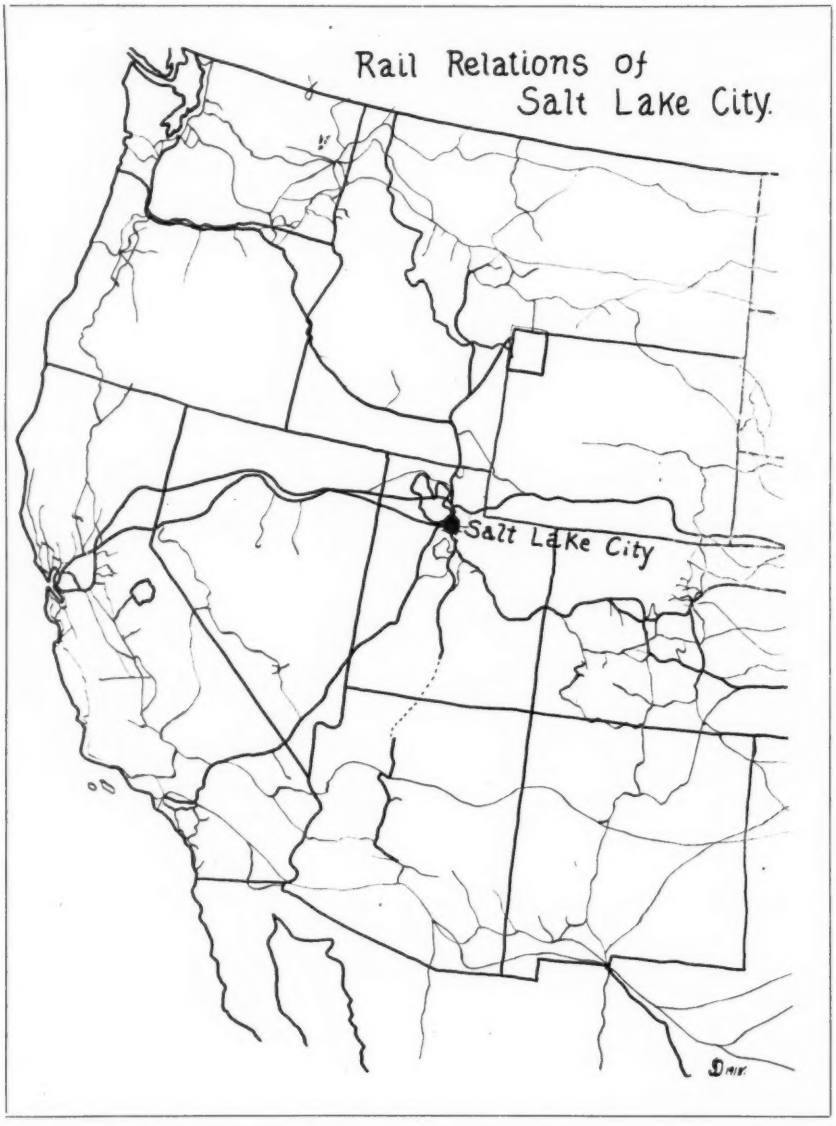
Although in a wonderfully beautiful valley on rich soil, the settlers found it no easy task to make a living and succeeded only through united action rendered possible by their compact religious organization. They were the first Americans to irrigate in historic times. The rainfall at Salt Lake City, although more than at many nearby valley points, averages only 18.33 inches annually. It is well distributed through the year, but May has the maximum, 2.16 inches, and July and August the minimum, each 0.5 inches. Besides being dry the climate is but little more mild in temperature than that of the central Mississippi Valley having the same four-season character. The January average is 27.9 degrees, July 75.5 degrees, and annual 51.3 degrees Fahrenheit. The Mormons also found it windy, so now the visitor is impressed by the great number of Lombardy poplar wind breaks. Blizzards come from the mountains and the snow is heavy but the summers are beautiful.

The City a Railroad Center

The Mormon Colonists came in 1847 and the gold rush to California which began in 1848 gave them a chance to help themselves by helping others. When the first railroad came to the valley (1869), it was thought best to run it north of the lake, so it did not go through Salt Lake City, but came near and the start the city had, together with its religious importance and the fact that it is as well situated as any city in the basin, kept it far in the lead of all cities between the Great Plains and the Pacific Coast. The coming of railroads from Colorado entering the valley south of the city and from Los Angeles and San Francisco around the south end of the lake makes Salt Lake City now the most important railroad center.

The first railroad, the Union Pacific, was built by government aid with its main object to connect the Pacific Coast with the eastern states for political solidarity, hence about all the engineers looked for was a short and feasible route. The original line runs north of the lake but it was later shortened by the line or "cut off" across the lake. This route happened to pass through a rich coal and oil section and near other valuable deposits such as the Park City lead-silver region to which it runs a spur south from Echo. Park City is now also reached direct from Salt Lake City by a spur of the Denver and Rio Grande which climbs through Par-

ley's Canyon. The Union Pacific system has been extended in the name of the Oregon Short Line, to connect Salt Lake City directly with Yellowstone National Park, Butte, Montana, and Portland, Oregon. The junction with the main transcontinental line, thirty seven miles north of Salt Lake has given rise to the important



center, Ogden. The Denver and Rio Grande railroad came through the rich mining sections of Colorado and followed coal deposits over Soldier Summit. The road was forced to almost continuous mountain climbing and a long route, but passes

through wonderful scenery. The Wasatch Range and its spurs, forming the divide between the Green-Colorado River system and the Bonneville Basin, runs southwest into southern Utah and causes heavier rainfall and better opportunity for irrigation on the edge of the desert to the west. This resulted in a string of towns which had much to do with determining the route of the Los Angeles and Salt Lake Railway. This line will be within easy reach of the coal and iron deposits in and east of Iron County, Utah, when it is deemed economically possible to exploit them.

Minerals and Water Power

Since the placing of Salt Lake City for agricultural and religious reasons, the valley in which it stands, Salt Lake County, has become the foremost county in the state in value of mineral production with $40,126,857 in 1914, or almost eight times as much as Juab, the next county in rank. The state had a mineral output in 1918 valued at $97,000,000. Bingham Canyon mines near Salt Lake City make Utah the fourth copper state following Arizona, Montana, and Michigan in order. The other very valuable items of output are lead, silver, zinc, gold, gypsum, gilsonite, oil shales, and salt. Sulphuric acid is made from the abundant pyrite and Portland cement production reached 20,798 tons in 1914. The great relief of the whole region gives Utah and surrounding territory an almost limitless resource in water power. In 1917 there were 82,264 horse power developed in Utah most of which was within one hundred miles of Salt Lake City, and there was as much more close by in Idaho. Available water power exclusive of the Green-Colorado system which must some day offer over 2,000,000 horse power, is estimated to be 460,160 horse power within 300 miles of the city.

Manufacturing and Agriculture

Salt Lake City is the center for all these interests, and smelting is the leading industry of the region although in the city proper printing and publishing is first because of the Mormon church publications. This is followed in value by confectionery, foundry and machine shop products, lumber and timber, copper, tin and sheet iron, and leather goods.

Salt Lake has large stock yards and meat packing is important in the valley centering just outside the city to the northwest. Several of these industries grow out of the agricultural production of the state. Hay, mostly alfalfa, ranks first with a production valued at $12,675,000 (2.2 tons per acre) in 1916 and followed in order by wheat (70% winter, 20 bu. per acre; 30% springs, 25 bu. per acre) $10,488,000; sugar beets $5,335,470 (12.75

tons per acre); potatoes $4,680,000 (180 bu. per acre); wool $3,600,000.

Summing up the conditions we find Salt Lake City in one of the most interesting physiographic sections of the west, the most important railway center, the most important mining center, and most important agricultural center in the intermontane region, beside being the Zion of the Mormon church.

As a Mormon Center

The true name of this church is, "Church of Jesus Christ of Latter Day Saints." About half the people of the city belong to this church. The population in 1917 was 140,246. The church seems to be much like other protestant churches except that it has no regular ministers and is better organized than any other. Like so many other creeds the Mormons claim to have a deeper religion, and to be the only true church. Polygamy was abolished in 1891 on account of the United States law against it, but many still believe in it.

Each ward has its Mormon chapel and there is one on the Temple grounds. The Temple is not a church but a place of baptism, marriage, and rites for the dead. There are always many people in the building engaged in sacred ceremonies which must not be interrupted, so no one is admitted except members of the church in high standing. The building is magnificent, being built of gray granite from Cottonwood Canyon near the city. It took forty years to build it, 1853-1893, and it cost $4,000,000. It is 1865 by 99 feet and 222 feet high. On the highest pinacle of the east end stands a statue of the Mormon prophet Moroni, twelve feet high, of hammered copper covered with gold leaf. Moroni is said to have been the son of Mormon who wrote the Book of Mormon.

Besides the Temple there is the Tabernacle, the great assembly hall on the Temple grounds. It was built when the nearest railroad was still 1000 miles away and few articles such as nails were used in its construction. The great oblong dome of the roof was put together mostly with pegs and thongs. In this hall is the famous organ which was the largest in the world until a larger was built in Liverpool, England, in 1918. The Tabernacle seats 12,000 and is famous for its acoustic qualities. One can hear as well in the rear of the balcony as in the center of the main floor a few rows back.

Other Features of the City

Just outside the Temple block stand the beautiful offices of the Mormon church and the Utah Hotel which is one of the finest

hotels in the West. The streets are numbered in all directions from the Temple block. The civic center is just to the southeast and the two railroad stations and two interurban stations a few blocks to the west and southwest. Near the stations and north and south and west of them are the industrial sections in the level part of town, while the best residence sections are east and southeast of the shore benches above the smoke. To the north close to the Temple rises a delta built into the old lake; on this is strikingly perched the magnificent capitol of Utah. It is of the same gray granite used in the Temple. The interior is of Georgia marble and Utah birdseye marble. The building has a graceful dome rising 273 feet above the base which is 500 by 250 feet in size. On the edge of the Fort Douglas military reserve stands the University of Utah so placed that the beautiful Administration Building stands at the upper end of the main east and west street, Second South Street.

The worst faults with the plan of the city are the oversized blocks and the lack of diagonal streets. The former gives rise to many alley streets and blind courtways which are undesirable. The very broad streets laid out by the settlers make the need of diagonal streets not so pressing now, but they will be greatly needed in the future when it will be much more expensive to put them in.

Salt Lake City is a beautiful city standing in its wonderful valley surrounded by untold beauty, resources, and power. Although this gem is dulled a little not only by soft coal smoke but by the blacker fumes of religious contention it is already lifting its head above both.

NOTICE!

National Council of Geography Teachers

Owing to existing conditions the Executive Committee has decided not to hold a meeting of the National Council this year. A business meeting of the Board of Directors and Executive Committee will be held in Baltimore in connection with the meeting of the Association of American Geographers, December 27-30. Directors are requested to appoint from their respective states a proxy, who expects to be present, in case they themselves cannot attend the meeting. Geo. J. Miller, Secretary.

OHIO CANALS

By Charles K. Chapman
J. W. Scott High School, Toledo, Ohio

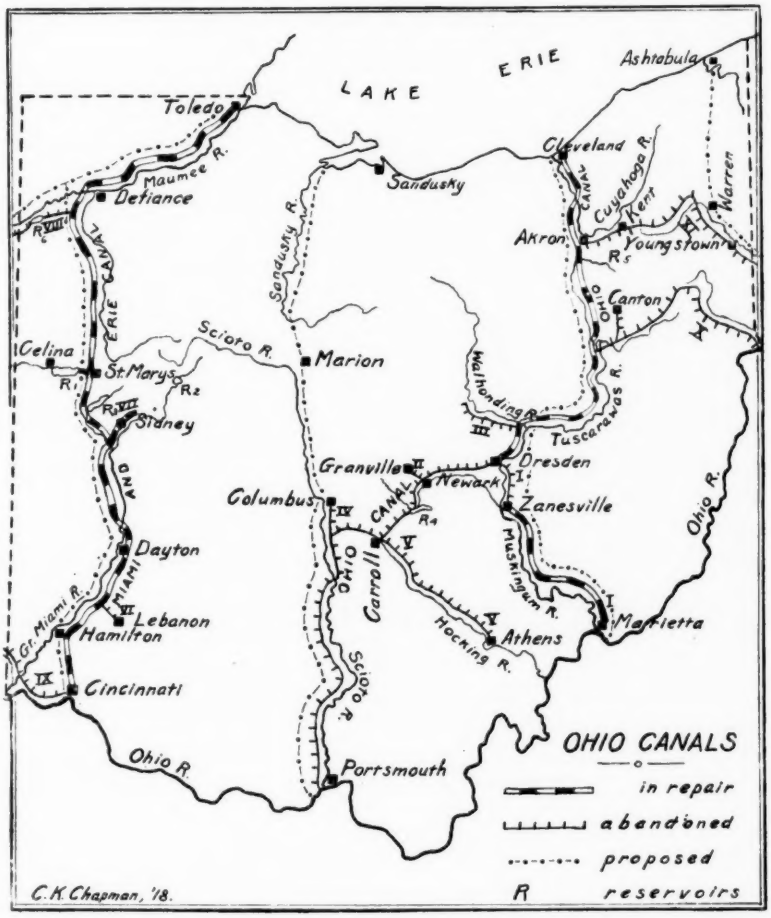
ONE merely consulting a number of recent text books on geography and history would infer, from the maps at least, that the canals of Ohio are a going concern from Cleveland to Portsmouth and from Cincinnati to Toledo. The writer has lived several years in the vicinity of each of the main canals and has had opportunity to visit points from terminal to terminal along each canal, and four of the branch canals, all of which netted the sight of one canal boat in operation. To give a brief account of the physical history of the Ohio canals, to present some idea of their condition and use at this time, and to outline projects for which surveys have been made and estimates prepared, is the purpose of this article.

The construction of the Ohio canals was a part of the great enterprise of connecting the trans-Appalachian region with the Atlantic seaboard. A communication from De Witt Clinton to Gov. Thomas Worthington of Ohio pointing out the importance of a complete waterways system from the Mississippi to the Atlantic by way of the Lakes and the Erie Canal, then under construction, was laid before the Ohio legislature in the winter of 1816-17. No action was taken as the cost seemed to be prohibitive. Under the urge of public sentiment and the steady insistence of the Executive Department, a Canal Commission was five years later created which submitted a complete plan and estimates (winter 1822-23). The canals were completed within the estimated time and cost. Following is a brief account of the canals and branches constructed by the state, and of the private or quasi-public canals connecting with the state system.

The Ohio and Erie Canal (begun 1825, completed 1833). The original purpose was to build one canal diagonally across the state from Cleveland to Cincinnati, but the summit level connecting the Scioto and Miami watersheds was found to be higher than the water supply levels on which the canal must depend for operation. Consequently the Scioto valley became the outlet to the Ohio River. As constructed the canal leaves the Scioto valley at a point 12 miles south of Columbus, crosses the Licking summit to Dresden Junction, follows the valley of the Muskingum and Tuscarawas to the Summit summit, then down the Cuyahoga to Cleveland. Great things were expected of this canal as a route of through traffic from the Ohio River to Lake Erie, but the water

supply on the Licking summit was insufficient and the traffic was always largely local.

The Ohio and Erie Canal was much more fully blessed with



Key to Map of Ohio Canals: I, Muskingum Improvement; II, Granville Branch; III, Walhonding Branch; IV, Columbus Branch; V, Hocking Branch; VI, Warren County Branch; VII, Sidney Branch; VIII, Wabash and Erie Canal; IX, Cincinnati and Whitewater Canal; X, Sandy and Beaver Canal; XI, Pennsylvania and Ohio Canal; R. 1, Grand Reservoir; R. 2, Lewiston Reservoir; R. 3, Loramie Reservoir; R. 4, Licking Reservoir; R. 5, Portage Reservoir; R. 6, Six-Mile Reservoir.

branch canals than the Miami and Erie Canal. The Columbus branch joined the main canal at a point 12 miles south of the city.

The Hocking branch, extending northwesterly 56 miles from Athens to join the main canal at Carroll, was built as an outlet to the coal of the Hocking Valley.

The Granville branch extended from Newark to Granville. It had considerable value as a feeder (water supply). It was abandoned in 1876.

The Walhonding branch extended 25 miles up the valley of the Walhonding River.

The Sandy and Beaver Canal was a private enterprise. It extended through Stark, Carroll, and Columbiana counties, 73 miles to the Ohio River. There was a 12-mile branch to Canton. The company failed before the completion of the canal, and it was abandoned except the six miles next the Ohio and Erie Canal, which were acquired by Ohio in 1856. This section has been abandoned and reverted to the original owners.

The Pennsylvania and Ohio Canal extended from the Ohio and Erie Canal at Akron to the Pennsylvania and Erie Canal via Kent, Warren and the Mahoning valley; it was 93 miles long, was completed in 1840 and abandoned and sold in 1877. The State owned considerable stock in this canal.

The Dresden (or Muskingum) Side-Cut leads from the Ohio and Erie Canal to the Muskingum Improvement.

The Miami and Erie Canal (begun 1825, completed 1845). The southern division of this canal was built from Dayton to Cincinnati (1825-1833) to compensate this part of the state when it was found impossible to build a canal via Columbus and Dayton from Cleveland to Cincinnati. Land grants secured from the Federal Government by the State of Indiana to aid in the construction of a canal connecting Lake Erie with the Wabash Valley were released to Ohio, and that part of the Wabash and Erie canal east of the state line was constructed by the State. This was completed in 1842. In 1828 the Ohio legislature authorized the extension of the Miami Canal to Lake Erie, via Toledo, but the connecting link between it and the Wabash and Erie Canal was not completed until 1845. Federal land grants aided in this construction. Federal grants of land to aid canal construction within Ohio comprised 292,688 acres for the Wabash and Erie Canal, 421,397 acres for the Miami Extension between Dayton and Defiance, and 500,000 acres for general canal purposes. The State realized $2,257,487.32 from the sale of these lands. The only demand made by the Federal Government was the perpetuation of the canals as lines of transport and the free carriage of persons and property connected with Federal business.

Cincinnati and Whitewater Canal. Connecting with the Miami and Erie Canal was the Cincinnati and Whitewater Canal extending a distance of 90 miles from Cincinnati to the Whitewater River and up its valley into Indiana. Ohio owned $150,000 stock in this canal. It was abandoned in 1863.

The Warren County Canal was begun as a private enterprise (1830). After some construction had been done it was purchased by the State (1836) and completed. It was sold to private parties in 1855 at a loss to the State of $177,552.

The Sidney branch extends up to the east branch of the Great Miami River to Port Jefferson, 14 miles. This is an important feeder.

A short feeder extends to the Grand Reservoir, affording navigation from St. Mary's to Celina at the west end of the reservoir.

The Muskingum Improvement (completed 1841). The Muskingum River was canalized from Marietta to Dresden, 91 miles, where it connects with the Ohio and Erie Canal by the Dresden side-cut. This improvement was ceded to the Federal Government in 1886 and is maintained in excellent condition from Marietta to Zanesville, with some local traffic.

The minimum dimensions for all the state construction were 40 feet width at the water surface, 26 feet width at the bottom, depth 4 feet. For the most part the canals exceeded these dimensions. The Ohio and Erie Canal had a total length of 512.26 miles including branches and feeders, and a total lockage of 1206 feet. The Miami and Erie Canal had a total length of 301.49 miles and a total lockage of 890 feet. The shallowest parts of the system accommodated boats of 79 tons.

The reservoirs are given with their present acreages. All of these are now (1916 report) state parks except the Loramie, and are valued at $6,219,000. They are excellent hunting, fishing and camping grounds. St. Marys Lake (Grand), 15,748 A.; Indian Lake (Lewiston), 6334 A.; Buckeye Lake (Licking), 4000 A.; Portage, 2194 A.; Loramie, 1900 A.

From the time of the completion of each unit put in operation, the canals enjoyed a large traffic and returned a handsome profit, besides providing for the upkeep. But with the coming of railroad competition the returns from the canals fell off, and in 1865 the canals showed a deficit. Since that time steam and electric railroads and other interests have made repeated assaults on the canal system in the endeavor to secure portions of the canal property for their own uses and for little or no return. For the most part these attacks have failed. The attitude of successive legislatures has been passively destructive except for a short-lived spasm to be noted later. In 1861 the legislature authorized the leasing of the canals for an annual rental of $20,075. The canals were to be kept in operating condition and so returned to the State. No survey or appraisal was made nor was any bond required. In 1877 the lessee refused to make payment of the

rental and the canals reverted to the State in a sadly deteriorated and depreciated condition. Following this event assaults on the system became more and more vicious. These culminated in 1903-04, when a proposition to lease both banks of the Miami and Erie Canal for railroad purposes failed in the legislature but only after a most bitter fight.

From time to time parts of the canal system have been abandoned. Some of these abandonments have already been noted. In 1863, 0.75 mile at the Cincinnati terminal was abandoned for the use of the city for street and sewer purposes. This was later occupied by the (now) Pennsyvania Lines for depot and terminal facilities, but recovery has been made by the State and part of the land sold and part leased on the basis of a proper valuation. In this case great loss to the canal system comes in the large expenditure necessary to provide lockage into the Ohio River and terminal facilities in any future rehabilitation of the canals. Since that time 9 miles more have been assigned to the City of Cincinnati for street and subway purposes.

In 1872 three miles of the Cleveland terminal were released to the city for street purposes. This was almost immediately occupied by a railroad now leased by the Baltimore and Ohio R. R. What a coincidence! The state has never secured any return in this case.

In 1864 five miles of the canal terminal were vacated to the city of Toledo for street and sewer purposes, but in this case the canal was provided with a new and perhaps better outlet to the harbor. Part of the old canal bed is occupied by the W. and L. E. R. R., the Lucas County Court House and by valuable private buildings. Comparatively little of it is now used as originally intended. The valuation now would easily be from three to four million dollars. (1914 estimate, O. S. Rp.)

Of the Walhonding branch, 19 miles were abandoned to a railroad now a part of the Pennsylvania Lines for a consideration of one dollar, provided a railroad be completed in five years. The construction was not done as provided. The State has recovered and disposed of this property at a proper return.

The Hamilton Side-Cut was recovered from railroad squatters, parcelled, and sold at a real valuation.

The Hocking branch from Nelsonville to Athens was deeded to abutting property owners. The rest of it is under lease to the Hocking Valley R. R. as much as is required for railroad use.

The Wabash and Erie branch was abandoned from Junction to the Indiana line, together with Six-Mile Reservoir, and the property given to abutting land owners. This was a bit of last-minute, end-of-the-session enactment of the legislature. As this

was one of the land-grant canals and is now used in no way to maintain transportation, an interesting question of title is involved.

In 1911 the legislature ordered the abandonment of the Ohio and Erie Canal from Dresden to Portsmouth, together with all feeders and branches, and directed that appraisal be made. This work is now (1917) largely completed. These lands may be leased or sold at the discretion of the Superintendent of Public Works. This does not include Buckeye Lake, now a state park.

From 1906 to 1909, $1,844,000 was spent in dredging and in the construction of new locks and gates between Dresden and Cleveland, and between Toledo and Cincinnati (mostly from Toledo to Defiance, and from Dayton to Cincinnati). For some reason this work was rather suddenly stopped. There is perhaps some connection between this and the abandonment of 1911.

At the present time the canals are under the authority of the Superintendent of Public Works. He has rather wide powers, too wide in fact He may dispose of canal property ordered sold and lease canal property or water for 15 years at 6 per cent of the appraised value, and he is responsible for the appraisal.

In times past the canal system has been a fruitful plum tree for political hirelings. At the present time the income of the State from water and pipe line leases would be much higher were it not for the long leases granted in times past at absurd figures where political pull was a part of the consideration.

In 1888 the legislature empowered the Canal Commissioners to make a survey and map of all canal lands. Following their findings came a grist of suits by the State. Many squatters were dispossessed, and considerable land not necessary to canal purposes was sold.

Since 1856 the yearly expenditures for canals by the State have exceeded the income from all sources except for the past five or six years, and even in those years not a little of the income has been from the sale of canal lands. In this profit the large abandonments of 1911 and the rehabilitation carried through (1906-09) are contributing factors. For 1916 the receipts were as follows:

Canal land and public park rentals	$ 82,442.85	
Pipe permits for water	57,795.25	
Water power rentals	39,017.44	
Boat licenses (not canal boats)	8,159.00	
Sale of canal lands	58,007.10	
Tolls	85.30	
Total receipts		$251,574.13
Total expenditures		178,413.11

Of these expenditures, in round numbers, $80,000 was for salaries and wages, $76,000 for permanent improvements, and $17,000 for maintenance. In 1917 the receipts were $218,187.20, of which $18.75 was for tolls collected on five miles of the canal within the City of Cincinnati. From a great system of over 1000 miles (private lines included) the canals have dwindled to 392 miles "in use," with a collection for tolls of $18.75—the total cost of constructing the canals was over $16,000,000. Through its canals the State of Ohio was once a great life giver—now it is a mere summer-resort keeper and water peddler.

Proposed Barge Canal

In recent years there have been numerous proposals to connect Lake Erie and the Ohio River by a barge canal. The Federal Government (1894) authorized a survey whose findings are here briefly outlined. The report states that three routes are feasible for canals 85 feet wide at the water surface, 60 feet wide at the bottom, and 10 feet deep, and that traffic and water supply would be sufficient to keep these routes in operation (the Congressional resolution called for a report on the feasibility of a canal 7 feet in depth). The three routes are called the Eastern, Central, and Western, respectively. The Eastern route follows the Ohio and Erie Canal to Dresden and the Muskingum Improvement to the Ohio River. The Central route follows the Sandusky River to Upper Sandusky, crosses the divide to Marion, and follows the Scioto River to the Ohio River. The Western route follows the Miami and Erie Canal throughout. The report (1896) advised against the immediate construction of a canal on any of these routes. The following table shows why such construction should wait on the improvement of the Ohio River.

Days of possible navigation during the 9 months of the canal season	Unimproved river		Improved river	
	7 ft. depth	10 ft. depth	7 ft. depth	10 ft. depth
At Cincinnati	108 days	87 days	226 days	123 days
At Portsmouth	102 days	79 days	216 days	112 days
At Marietta	59 days	51 days	179 days	64 days

The desirability of the routes is shown by the following table:

Ranking of routes	Eastern	Central	Western
Length, lockage, and time of transit	2	1	3
Water supply	3	2	1
Cost	1	2	3

Terminal facilities	2	3	1
Through traffic	3	1	2
Tonnage from tributary country	2	3	1
Urban population and local traffic directly on the route	2	3	1
Future cost of maintenance and operation	2	1	3

The estimated lower cost of the Eastern route is due to the Muskingum improvement which would require little modification. The Western route has the advantage of being in part on the route of the proposed barge canal connecting Lakes Michigan and Erie.

There is also proposed a 13 foot barge canal to connect Ashtabula on Lake Erie with Pittsburg via Youngstown and Niles, to be constructed at the cost of the territory benefited. Most of the benefits would accrue to the immediate Pittsburg district.

The Michigan-Erie project proposes the delivery of through cargoes to the seaboard via the Erie barge canal, using 2000 ton barges.

There is some doubt as to whether barges adapted to river navigation would serve for the Great Lakes and vice versa.

Recent reports of officials of Ohio strongly deprecate the further disposal by sale of the Ohio canal properties without submitting it to a referendum of the voters of the State. It is not idle to suggest that a state of the character of Ohio in industries and resources should conserve, correlate and use all its possible modes of transportation. The days of competition should come to an end and the coordination of transportation begin.

CALCUTTA

By Albertine Metzner
Jacksonville, Ill.

CALCUTTA, the largest city on the mainland of Asia, has the best harbor on the southern coast of the continent. With a latitude of 23½°, North, it is but seven degrees farther south than New Orleans, the principal southern port of the United States.

There are many similarities between Calcutta and New Orleans. Both cities are delta ports. New Orleans is 89 miles from the mouth of the Mississippi; Calcutta is 86 miles from the mouth of the Ganges, on its chief distributary, the Hugli. The mouths of both rivers are kept navigable by the expenditure of large sums of money for the construction of jetties and levees. Since both

cities lie in the vicinity of the northern trades, the summer climate is intensely hot and very moist. Poor drainage, with these weather conditions, make both cities unhealthful.

New Orleans and Calcutta are both surrounded by fertile lands that are devoted to the culture of rice, sugar cane and cotton.

There are three seasons at Calcutta. A pleasant cool season lasts from November to March. The average temperature is then about 72° Fahrenheit and there is little rain, with winds from the northwest. From April to June is a period of intense heat, when the average temperature is 83°. The mean maximum temperature, coming in May, is 102°. This great heat is somewhat relieved by the rains that begin to come in the later part of June and continue during the remainder of the summer. During the hot rainy season, the plague is likely to appear. In 1898 it was prevalent. Many traders and workmen fled from the city, producing a great shortage of labor at the docks and in the factories. In 1901 the plague caused 7800 deaths, in 1902 there were 7200 deaths, and in 1903, a toll of over 8000 deaths. Since then conditions have improved somewhat, due to better methods of sanitation. The south-west moonsoon brings the rains. The moonsoon is far more typically developed in this region than at New Orleans.

Calcutta has long been on important trade routes of the civilized world, though it is now a modern city. In the middle ages, it was the eastern terminus of an overland route between the Ganges and the Black Sea. After the discovery of the route around the southern point of Africa, it became one of the stopping places on the trip from western Europe to the East Indies and China. It is one of the chief ports on the Mediterranean-Suez Canal route to the Far East.

Calcutta was founded in 1690 by the English East India Company, and has now become the great entrepot of southern Asia. For the fiscal year ending Mar. 31, 1917, her foreign trade amounted to $481,000,000. The exports in 1915 were nearly twice the imports in value. The imports of Calcutta from the United Kingdom exceed her exports to that Kingdom, but her exports to the whole British Empire far exceed her imports from the whole Empire.

Calcutta receives trade by railroad, river steamer and native boat to the value of 23 million dollars from the great region drained by the Ganges and its tributary, the Brahmaputra. One-half of this total is brought by the East Indian Railroad. Much of the raw material is used in manufacturing at Calcutta, but the

larger part of it is exported. Raw cotton is sent to the United Kingdom, Italy, France, Spain, China, Japan, Australia and even the United States. Rice, wheat, barley, flour and pulse are exported in large quantities. Exports that amount to over two million dollars a year are raw jute, jute manufactures; raw hides and skins, lac, opium, seeds, grains, pulse, and flour, metal and ores, raw cotton, indigo, coal and coke, hemp, and saltpeter. Imports from the United States increased 50% during the year ending Mar. 31, 1917. This increase was due to larger shipments of mineral oil, motor cars and motorcycles, hardware and electrical machinery.

An event in shipping circles of Calcutta was the arrival of a 4-masted sailing boat from New York, bringing 298,000 tins of kerosene oil. The journey made by the most direct route required 128 days. The docks of the city extend for ten miles along the right bank of the Hugli river and are under the control of the Port Trust, which has jurisdiction over the mouth of the river and also over the floating bridge 1530 ft. long by which the river is crossed.

The industrial plants are outside of the municipal limits in Howrah, a suburb on the opposite bank of the Hugli. Howrah is also the terminus of three railroad systems. It is the center of the jute industry, of which India has a monopoly. If the jute is to be shipped, it is pressed into bales like raw cotton. Simliar to hemp and flax, the stalk is soaked and allowed partially to decay before the fibres can be removed. There are 115 jute presses near Calcutta, employing 30,000 people. Mills for weaving jute employ 200,000 hands. The manufactured products are bags used for packing wool and grain, and Hessian cloth used in the manufacture of linoleum. Jute cloth is the cheapest fabric made.

Beside the jute mills there are cotton mills, oil mills, rice mills, tanneries, potteries, rope works and salt crushing mills. The mills are chiefly in the hands of English capitalists. The prospects of the city as an industrial center are promising, as there are valuable coal fields not far away.

Until 1912, Calcutta was the capital city of all India. The removal of the capitol to Delhi was a blow to Calcutta. The removal of the court has caused the removal from the city of a large part of its best white population. By the last census the city had a population of 1,222,000. Two-thirds of the population are Hindoos, less than one-third are Mohammedans, and but a small number are Christians. Altho some of the people are wealthy, they live contentedly, for the most part, in hovels. The large modern buildings and residences are owned chiefly by foreigners.

Calcutta is still the capital of the province of Bengal, the richest and most fertile province of all India, noted for its immense rice fields and Bengal tigers.

THE VALUE OF PLACE GEOGRAPHY IN A COMMERCIAL GEOGRAPHY COURSE

By Esther Wessinger
Duluth, Minn.

THERE can scarcely be any doubt that place geography should occupy a position in a high school commercial geography course. The woeful ignorance which many high school and even college students display concerning common locations even within the United States in which they live, would be the strongest possible argument for it. The question is to determine what emphasis and what importance is to be given to work of this kind. This question can best be answered by considering its ultimate value to the student and the drawbacks which necessarily accompany such an exercise. Let us consider the latter.

Place geography may be made a purely memory exercise. If the pupil learns merely that such a city is in a certain country and that such a mountain range is in another country, as one would learn a stanza of poetry, then there is little value in the exercise If, however, the pupil learns to visualize his map and to call up a mental picture of the location of the city within a country when it is named, then the exercise is of real value.

What are the inherent values of learning the geographical locations of important places and geographical features? Such a knowledge is a valuable possession because of the constant reference to them in literature, in magazines, in the daily news, in lectures and in conversation. Every day one sees or hears references to places of some consequence in the world with which he is unfamiliar, or would be so had he not profited by taking a course that included place geography.

The merit of a thing may sometimes become its weak point. The worst criticism that can be brought against place geography is that it is primarily a memory exercise. The danger lies in the fact that mere memorization of items does not train thought or judgment. It is a mental exercise to be sure, but, in this case, it could scarcely be called a valuable one.

How can this criticism best be met? In the first place, there should be correlation of the facts which are memorized. No place should be remembered as a single isolated bit of information, but

should be the stimulus which awakens several different trains of thought. No pupil is able to remember a bare spot on a map unless there is an outstanding fact connected with it,—some point which catches his interest and holds his mind upon it. The point of interest may not always be the same. It may be historical as in the case of the Italian cities; it may be economic as in the case of many English or German cities. At any rate, there should be some attractiveness in order that the dry bones of fact may be made less dry for the pupil. In this way he will be possessed of a little fund of information about the more important places in the world. Thus geographical location will not be a mere memory exercise, but a practical working basis which will be of real service to the student.

As to the place which it holds in the course,—it should have one without any doubt. If it can be used in the proper way, its place is one of very real importance. It should not be used too extensively or given too much time because there is always danger of narrowing facts down to a statistical basis which tends in turn to be impractible and restrictive. It is not difficult to see that if such exercises were used extensively they might tend to kill the pupil's interest in geography. Again it would create a false impression concerning the real content of geography in the minds of pupils.

Place geography has a definite value, but like all good things, it should not be overworked. If its weakness can be avoided it may be used as an instrument of real worth in teaching geography.

NOTES

Development of Power Resources in the United Kingdom

TWO committees having this aim in view have recently been appointed by the British Board of Trade. The earlier of the two appointed to consider what steps should be taken by legislation or otherwise to ensure an adequate and economical supply of electric power for all classes of consumers, has just issued its report in the form of a Blue-book (Cd. 9062), from which *The Times Engineering Supplement* for June, 1918, has drawn up a statement of the main conclusions unanimously arrived at by the members of the committee. Though many other countries may present greater advantages for the development of electric power, it is pointed out by way of compensation that the volume and high degree of concentration of British industries must tend to reduce the loss due to the transmission of the power when developed.

With the view of organizing the most economical means for developing and applying such power it is recommended that a central authority for the whole of the United Kingdom should be created to control this matter, and that ultimately the whole of Great Britain and Ireland should be divided up into suitable electrical districts, in which District Electricity Boards should be established to acquire all the main generating stations and transmission lines within their districts, to link up and develop the electricity supply, to erect new stations where and when necessary, and so forth.

To enable the board to exercise those powers, it is suggested that while local authorities should still have a voice in the construction of overhead transmission lines they should be deprived of their right to veto and that the Electricity Commissioners should be authorized to place lines over or under any private lands, compensation being assessed by arbitration after the work is done. The other committee has just been appointed with the task of considering the water-power possibilities of the different parts of the United Kingdom. G. G. C.

Interesting Sidelights on Recent Conditions in Russia

A correspondent writing from some rural district in Scotland, apparently after a prolonged business residence in the Ukraine, sends to the *Glasgow Herald* (Aug. 6, 1918) some notes on conditions in that region at the time when the Ukraine Government, the Bolsheviki and the Workmen's Committee were all trying to get the upper hand. The factories, he tells us, were seized by the Workmen's Committee, who dismissed such directors and managers as they objected to, and stationing an armed guard at the gates, allowed no one to enter without a permit. "The odd thing," he adds, "was that under this bizarre system almost a normal output of work was maintained." Speaking of the advance that had been going on even under Czarism he mentions one practice "found also in Japan" as "not worthy of imitation here. Batches of children from the country are brought into the cities to become familiar with the conditions of city life, and town children are taken into the country to study rural life." G. G. C.

Industrial Development of the Firth of Forth Area

This matter has been engaging a good deal of attention locally in recent years, probably in consequence of the stimulus imparted by the selection of Rosyth, just above the Forth Bridge on the north side of the Firth, as one of the chief naval centres of the United Kingdom, and enhanced by the general impetus given to

development schemes by the war. The local authorities of the different parts of the area combined in conducting during 1917 an investigation into the resources and possibilities of the whole of the estuary, and have issued a report giving details as to numerous sites suitable for ship yards and other industries, and the opportunities for increasing their number considerably by reclamation from the sea concurrently with carrying out operations for the establishment and maintenance of deep navigable channels to the ports of Boness, Grangemouth, and Alloa above the Forth bridge. G. G. C.

THE CAVERNS OF LURAY

IN 1878 a remarkable cavern was discovered in Page County, Virginia. It is in the famous Shenandoah Valley, about 100 miles southwest of Washington, on the Norfolk and Western Railroad. Near the middle of the Valley, a hill rises some 200 feet above the valley floor and within this hill is the cavern with its many rooms and passages.

It is truly a wonder,—one of the few places which live up to their reputations. It is not large; a leisurely trip through it requires only a couple of hours, but upon it more grace and beauty have been expended than upon the whole 150 miles of winding corridors in the Mammoth Cave. There is scarcely a square yard of its ceiling without its pendants and tassels. There are hundreds of fluted columns, thousands of tapering stalactites, countless slender filaments in long lines that mark tiny joint planes in the roof through which the water seeps and upon evaporating slowly forms the stalactites. Along the sides the lime-charged waters have built terraces whose corrugated fronts and biscuit-work rims find their only rivals in the tan and azure terraces of the Mammoth Hot Springs in Yellowstone Park.

The stalactites range from slender pencils to giant columns a hundred feet in circumference. Some of the stalagmites squat like fat Eskimo or bunchy cacti; others stand like draped figures, or taper upward and touch tip to tip with their companions. Still others hang like blankets pinned to the ceiling by their corners, and through their amber folds the lights shine and make them look like sheets of thin-cut bacon in strips of lean and strips of fat. In the "Leather Market" they hang from the dome like broad sides of soft brown leather, pinned by a corner. In the "Poultry Market" and "Fish Market" they droop in long lines like fish suspended by their gills and like geese and ducks with heads downward. In one feathery form of pure white the curved and droop-

ing pendants touch edge to edge and form a tapering shape that earns and merits the name of the Angel's Wing. In the Great Ball Room the chandeliers hang in the profusion of a royal palace. Even the guide's rustic jokes and his attempts at serious descriptions of the "Ample Theatre" and "Proserpeens" bower add only a touch of variety. He points out in tender tones the image of Christ blessing little children and the figure of St. Peter standing with bowed head. And both are very realistic even without the guide's reverential tones.

Two groups of stalactites of varying lengths and sizes form the "Organ" and the "Cathedral Chimes"; upon these the local musician plays familiar airs. The tones are of a remarkable bell-like purity. The cavern is lighted with incandescent lights, skillfully placed where they illuminate features of peculiar beauty.

A trip to the caverns of Luray is one well worth taking.*

R. H. WHITBECK.

EDITORIAL

THE AMERICAN GEOGRAPHICAL SOCIETY AND THE JOURNAL OF GEOGRAPHY

WITH this issue of the Journal of Geography the magazine passes into new hands,—back to New York whence it came to us somewhat more than eight years ago. Back to the metropolis, but to new editorial and business management.

A few years ago the American Geographical Society of New York adopted a policy of expansion. Dr. Isaiah Bowman, then a professor of geography at Yale, was called to the directorship of the Society. The Society's monthly magazine, *The Bulletin of the American Geographical Society*, was given new form and new standards and became the present *Geographical Review*, regarded by some as the leading geographical magazine in the English language. The Society also established very close ties with the Association of American Geographers, holding an annual joint meeting with the Association, providing for the printing of its *Annals* and otherwise co-operating with it on terms of great benefit to the Association.

When the organization of the National Council of Geography Teachers was under consideration, the Director of the American Geographical Society, Dr. Bowman, gave his unqualified support to the movement, and after the formation of the National Council, gave it financial assistance each year.

* An illustrated booklet of information may be obtained free by addressing *The Luray Caverns Corporation, Luray, Va.*

While the American Geographical Society has been aiding other geographical organizations, it has never in the slightest degree sought to control or influence their policies. The Society has become the patron of scientific and educational geography in this country, as the National Geographic Society (Washington) has become the greatest popularizer of geography in the world.

When Dr. Bowman offered to take over the Journal of Geography and give it the firm backing and financial support of the American Geographical Society, the editor felt that the acceptance of the offer was the best thing that could happen to the magazine. A magazine like the Journal of Geography can scarcely be expected to pay its way. Some one must give liberally of his time or else some generous person or organization must make up the financial deficit. This situation will now be permanently met and we look forward to seeing the Journal strengthened in every way. Instead of going to 2200 subscribers, it ought to reach 5000 or 10,000 or more.

We believe that the greatest epoch for American geography lies just ahead. We see evidences everywhere of new and widespread interest in world geography. If ever conditions were propitious for launching a great movement for more geography and better geography in American schools, those conditions are here today. If the three strong geographical societies in this country, or even one or two of them, will join hands with the recently formed National Council of Geography Teachers and give it hearty support, geography can be made to hold a place of high esteem in American education. And now is the time to do it.

Believing that this can best be attained by placing the Journal of Geography—which is vital to the life of the National Council—in the hands of the American Geagraphical Society, we find genuine satisfaction in seeing this accomplished.

We have a host of people to thank, people who have been friends of the Journal in many ways, and we take this opportunity to express our appreciation. If the editor is poorer financially for his connection with the Journal, he is richer in acquaintances.

And now we throw a horse shoe to the new editor and new manager.

R. H. WHITBECK.

A FEW EXAMPLES OF OFFICIAL GERMAN BOASTS AND THREATS

In view of the complete collapse of Germany, the flight of the Kaiser, the humiliation of the whole military caste, and the utter defeat of the "invincible" German armies, it is interesting to recall a few of the many official boasts made during the past four and one-half years.

Soon after the Spanish-American war, Count Von Goetzen, a personal friend of the kaiser, said to Maj. N. A. Bailey, an American:

"About fifteen years from now, my country will start her great war. She will be in Paris in about two months after the commencement of hostilities. Her move on Paris will be but a step to her real object—the crushing of England. Everything will move like clockwork. We will be prepared and others will not be prepared. I speak of this because of the connection which it will have with your own country.

"Some months after we finish our work in Europe we will take New York and probably Washington and hold them for some time. We will put your country in its place with reference to Germany. We do not propose to take any of your territory, but we do intend to take a billion or more dollars from New York and other places. The Monroe Doctrine will be taken charge of by us, as we will then have put you in your place, and we will take charge of South America as far as we want to."

On Feb. 13, 1915, Gen. Wrochem wrote in *Der Tag*: "When peace is concluded we must, without unmanly scruples, thinking only of our own interests, take care that our Germany * * * * * * towers in such overwhelming might above all Europe that no imaginable coalition may presume to attack her."

In April, 1915, Maj. Leibster of the German army said to Mr. A. C. Roth, American vice consul at Plauen: "We are keeping books on you Americans. It's a long account and we haven't missed any details. Rest assured that the account will be presented to you some day for settlement * * * * * We are keeping the account in black and white * * * * with customary German thoroughness."

Next to German brutality, German egotism, insolence and boastfulness have done most to turn the world against Germany. Seldom has the kaiser or any of his circle spoken in public except to boast of German invincibility and to belittle their enemies. When the first troops left Berlin in August, 1914, the kaiser addressed them in grandiloquent language and assured them that they would return as conquerors "before the leaves fall." When the first British army joined the French the Kaiser promptly styled them "Kitchener's contemptible little army."

When Germany decided upon her unrestricted submarine campaign, Foreign Secretary Zimmerman announced that it would "bring Great Britain to her knees in a few months."

In September, 1917, the commander of the German battle fleet stated that all the submarine commanders were confident of the

ultimate complete success of the U-boats effort in bringing England to terms. In the same interview he said of America's entry into the war: "I do not attach much importance to it. The Americans may make themselves unpleasant by means of increased supplies of airplanes, technical material, etc., but they can hardly harm us seriously from a military point of view, and they will never become dangerous. They will no more be able to turn the scale in favor of the entente than Italy or Roumania."

In January, 1918, the German chancellor said: "Our military position was never so favorable as it is now. Our highly gifted army leaders face the future with undiminished confidence in victory. Throughout the army in the officers and the men lives unbroken the joy of battle."

"Should our enemies force us to prolong the war they will have to bear the consequences resulting from it."

Following the collapse of Russia the Kaiser made another of his many boastful speeches. Referring to the Allies he said: "But he who will not accept peace * * * * * must be forced to have peace. We desire to live in friendship with neighboring peoples, but the victory of German arms must first be recognized. Our troops under Hindenburg will continue to win it. Then peace will come."

Admiral von Capelle, German Secretary of the Navy, said on Apr. 17, 1918: "American help in men and airplanes and American participation in the war are comparatively small * * *

After America's entry into the war material help for the entente has not only not increased but has even decreased considerably. * * * * To sum up, it can be stated that the economic difficulties of our enemies have been increased by America's entry into the war * * * The danger point for England is already reached and the situation of the western powers grows worse from day to day." (Note that this was said only last April).

In June, 1918, von Hertling telegraphed: "I know that Prussian militarism * * * * has given Germany's sword and the German nation strength to triumph and that victory will bring a peace that will guarantee the German life."

Possibly the Crown Prince would now like to recall his bombastic words of Sept. 1917: "With scorn our enemies thrust back our offered hand of peace. The sword must continue its bloody work until our foes are compelled to adopt another attitude."

In May, 1918, the Emperor announced,—"The war can not terminate in any other manner than by the complete victory of Germany over all her enemies. The last few months have brought us successes which justify our title to the strong peace which shall open roads to victorious German commerce."

RECENT PUBLICATIONS

HISTORIC MACKINAC. By Edwin O. Wood. The Macmillan Co., New York, 1918. 2 Vols. $12.50 net.

This handsomely gotten up book of more than 1400 pages belongs rather more to the historians than to the geographers, although the latter will find much of interest in it. Mackinac will always be associated with those historico-geographic events which centered around the French explorations in North America, the struggle of France and England in the New World, and the rivalries of the fur traders. The story of Mackinac belongs to that delightful borderland of history and geography which Turner while at the University of Wisconsin made so interesting.

The author begins with the first explorations of the Upper Lakes and carries his readers step by step through the eventful history of New France and the Old Northwest on down to 1918. He modestly says in his preface,—"These volumes make no claim to rank with the achievements of the historians," yet we venture to say that the book will receive a cordial welcome from the historians.

Volume II is in large part a collection of chosen extracts dealing with Mackinac taken from books now out of print.

AN EXCEPTIONALLY VALUABLE U. S. GOVERNMENT PUBLICATION

Bulletin No. 2 of 1918, Bureau of Education, Department of the Interior is entitled *Guide to U. S. Government Publications.* It was compiled by Walter I. Swanton. It presents compact diagrammatic schemes showing all of the departments of the Federal government, and their various divisions. Under each department is given the titles of the principal administrative officers, the phases of the department's work for which they are responsible, and the publications which they issue. It is this carefully prepared list of publications that makes the Bulletin of exceptional value. Not only are the publications listed, but a brief descriptive note usually accompanies the title, stating date of publication, number of pages, number of illustrations and maps, price if it is not free, and the place where it may be secured.

A host of people will thank the Bureau of Education for issuing this bulletin of over 200 closely printed pages. We believe teachers can get a copy free by asking the U. S. Bureau of Education, Washington, D. C.

Recent English Geographers

An Introduction to General Geography. By Alec A. Golding. Cambridge University Press. G. P. Putnam's Sons, New York. 1915. $1.10.

English text books in geography differ notably from the American. They are usually much smaller, rarely, if ever, do they include large colored maps, but sketch maps and diagrams are abundant. The above mentioned book covers the field of geography in 217 pages. Halftone cuts made from photographs, so numerous in American geographies, are entirely absent. The author says in his preface that the book "consists of slightly expanded notes which have been used in class for several years." Such, in fact, it plainly is. The material is a logically arranged collection of facts, too condensed to read interestingly; there is little or no attempt to appeal to the pupil's interest. Facts which the author considers ought to be learned are set down in order. The causal idea receives little attention and no locational geography is included.

There is, on the whole, so much agreement between leaders of geographical thought in Great Britain and the United States that one wonders why the elementary books of the two countries differ so widely. Books for secondary and higher schools differ much less.

The Teaching of Geography. By B. C. Wallis. Cambridge University Press. G. P. Putnam's Sons, New York. 1916. $1.00.

The author of this volume is a man well qualified by training and experience to write a helpful handbook on the teaching of geography. On the whole the book gives the impression of being addressed to better trained geography teachers than most of those who teach the subject in American elementary schools. The author speaks of "Transition Geography" and "Augmentative Geography," terms not heard on this side of the Atlantic. He says "the main part of geographical teaching lies in building up a gradually formed but steadily enlarged conception of the world's workers and the work they do." This is a thoroughly anthropocentric point of view with which we are in full accord. He emphasizes the social value of geography when he says: "Width of outlook, depth of insight, clearness of sympathy, are all cultivated by geographical studies." The book is helpful to teachers who view geography seriously, but the young teacher seeking direct help in method may find it somewhat wanting in the practical, concrete suggestions which she seeks.

FINAL BATTLE LINE IN FRANCE AND BELGIUM

Approximate Positions Held by the Allied and American Forces When Fighting Stopped Nov. 11.

Reproduced by Courtesy Chicago Tribune.

The final battle line as shown in the above map is in accord with the official statement issued by Gen. March in Washington.

1. The First American army held the sector from Bazeilles, just S. E. of Sedan, to the region on Manheulles.

2. The Second American army held from Manheulles to Portsur-sur-Seille.

This combined American front extended for fifty-two miles.

Under Gen. Foch's command the forces on the western front were shifted as necessity demanded, so that the definite sectors held by the British, French, Belgians, and Yanks were not so clearly defined at the close of hostilities as before the establishment of a unified command.

A. In Belgium from the Dutch border to the Lys and Scheldt rivers King Albert's forces held the line.

B. From the Scheldt to the Sambre river the British armies were stationed.

C. The French held the front from the Sambre southeast to the Meuse at Sedan, where they joined the left wing of the American armies that were advancing on a fifty-two mile front between the Meuse and the Moselle rivers.

D. Italians in force were operating in the region of Rocroi when the armistice went into effect.

The front through Lorraine and Alsace to the Swiss border was held mainly by the French. There was little active fighting there for a long time, and the battle line remained stationary for several years and was practically unchanged when firing ceased.

The Prussian System

of driving children through a hard and fast text-book course results every year in a suicide list of many school children.

Copyright

Filling Shell with Nitro Glycerine Pennsylvania Oil Field

IT IS YOUR DUTY

to see that the "Prussian System" is not fastened on **your** school. It is gratifying to know that this evil could not occur in the school-room where the pupils have **daily** access to PICTURE Material.

A pupil's opportunity to expand mentally each day is limited only by the means of traveling at hand — but whenever there is established a

"600 SET"

of **classified** stereographs and lantern slides, there is never a lost opportunity to SEE and to KNOW.

If there is not such a set of Visual Instruction material in your school, why don't you make the initial effort today to banish **forever** the "cut and dried" method of teaching

Write for a
"Partial Reprint." Folder of Free Loan Slides.

Communicate with the

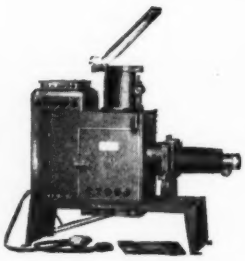
KEYSTONE VIEW COMPANY, INC. - DEPT. J

MEADVILLE, PENNSYLVANIA

Bausch and Lomb

BALOPTICON

THE PERFECT STEREOPTICON



Invaluable for educational and entertainment purposes—an ideal projection lantern in the classroom, laboratory or assembly hall. Models either for lantern slides or opaque objects (post cards, photo prints, specimens, etc.)—or both. Equipped with the new gas-filled Mazda Lamp, absolutely automatic.

Because of the demand made upon our resources for some of the government's most important military needs, we are unable to make Balopticon deliveries for the present. While proud to be of such service in this world crisis, we shall expect to serve our other patrons even more efficiently than before. when the world is again at peace.

Bausch & Lomb Optical Co.

NEW YORK WASHINGTON SAN FRANCISCO
CHICAGO ROCHESTER, N. Y. LONDON

Leading American Makers of Microscopes, Projection Apparatus (Balopticons), Photographic and Ophthalmic Lenses, Binoculars, Range Finders, Gun Sights, Searchlight Reflectors and Other High Grade Optical Products.

TIMELY MAPS

Here are a few maps in the new American History Series edited by Prof. Albert Bushnell Hart of Harvard, which will interest every wide-awake teacher of Geography. The titles are self explanatory.

A7 Colonial Commerce and Industries
A10 Westward Movement, 1763-1829
A13 Land and Water Routes, 1829-1860
A19 Development of Transportation, '73-'17
A20 Western Resources and Conservation
A21 Industrial United States
A22 Agricultural United States
H8 Medieval Commerce
H18 Industrial England

These maps are part of a comprehensive series of 62 maps edited by Professors Breasted and Huth of the University of Chicago, Professor Harding of Indiana University, Professor Hart of Harvard University, and Professor Bolton of the University of California.

DENOYER-GEPPERT COMPANY

Publishing School Maps

Designed by Educators **Edited by Scholars** **Produced by Craftsmen**
460 East Ohio Street **Chicago**

THE GEOGRAPHICAL REVIEW

Among the articles to be published in the Review during 1918 *are*

THE REAL TEMPERATURES OF NORTH AND SOUTH AMERICA - - - - - - - - - MARK JEFFERSON

THE FINN IN AMERICA - - - EUGENE VAN CLEEF

ALSACE-LORRAINE - - - - - - - LUCIEN GALLOIS

NATIONALITIES IN HUNGARY (A Series of four articles) - - - - - - - - - - - - B. C. WALLIS

TRAVELING IN CHINA'S SOUTHLAND, R. C. ANDREWS

To teachers of geography the Geographical Review has an emphatic claim because of its

Special Articles distinguished by their carefully selected illustrations and their maps compiled from the latest reliable authorities.

The Monthly Geographical Record of items topical in interest.

The section *Geographical Publications*, annotated bibliography that records practically every new book and article of geographcial importance.

The Review is published monthly: the yearly subscription is $5.00; single copies are 50 cents each.

Of the annual publications recently inaugurated by the American Geographical Society there are now available *The Andes of Southern Peru* by Dr. Isaiah Bowman, Director of the Society.

The Frontiers of Language and Nationality by Leon Dominian.

The magazine and the annual monograph free of charge, are among the privileges enjoyed by Fellows of the Society. Teachers and others interested in geographical affairs are invited to become Fellows. The annual dues are $10. Full particulars regarding Fellowship will be sent on request.

The American Geographical Society

BROADWAY AT 156th STREET NEW YORK

Essentials of Geography

By ALBERT PERRY BRIGHAM, A.M.
and CHARLES T. McFARLANE, Ph.D.

First Book, 227 pages; Second Book 432 pages, with State Supplements

Dryer's Economic Geography

Industrial treatment for Junior High Schools

Dryer's High School Geography

Physical—Economic—Regional

By CHARLES REDWAY DRYER, F.G.S.A., F.R.G.S.

Carpenter's Around the World With the Children

An Introduction to Geography

By FRANK G. CARPENTER

Carpenter's Geographical Readers

North America South America
Europe Asia Africa
Australia, Our Colonies, and Other Islands of the Sea

Carpenter's Industrial Readers

How the World is Fed
How the World is Clothed
How the World is Housed

Catalogues and descriptive circulars mailed on application.
Your correspondence will have prompt attention.

AMERICAN BOOK COMPANY

NEW YORK
CINCINNATI
CHICAGO
BOSTON
ATLANTA

330 East 22nd Street
CHICAGO